4.0 DESIGN AND IMPLEMENTATION

The selected cleanup alternative to be implemented under the Agreed Order with Ecology, is Alternative 5, that was presented in the RI/FS. This alternative includes excavation and off-site disposal of soil with concentrations of one or more of the target pesticides above the selected cleanup levels. Additional details regarding the design and installation of the cleanup alternative are presented in the following sections.

4.1 DESCRIPTION OF CLEANUP ACTION

The final cleanup action involves the excavation and off-site disposal and/or incineration of soil with concentrations of one or more of the target pesticides above the MTCA Method B residential soil cleanup levels shown on Table 6. The final cleanup action consists of the following elements:

- Collection of soil samples from the Category 3 Soils sampling locations prior to excavation for Toxicity Characteristic Leaching Procedure (TCLP) analysis;
- Excavation of soil from the site to a maximum depth of three feet bgs unless the analytical results of compliance samples indicate that deeper excavation is necessary. An estimated 1,400 tons of soil will be excavated and disposed of off-site or incinerated;
- Disposal of the soil waste in accordance with the dangerous waste regulations and/or the Contained In determination requirements;
- Compliance sampling and analysis to confirm that the soils meet the cleanup levels at the defined points of compliance;
- Restoration of the site to the existing conditions prior to the soil excavation and removal; and,
- Compliance monitoring of perched groundwater in the vadose zone as described in the SAP to confirm that either the perched groundwater in the vadose zone meets the cleanup levels at the defined points of compliance or it is determined that no ~~continuous~~ perched groundwater-bearing zone is present in the vadose zone soils at the Site.

4.1.1 Cleanup Objectives

The objective of the cleanup described in this CAP is to meet the requirements of MTCA 4WAC 173-340 for completion of the cleanup actions required by the Agreed Order. This will be achieved through a final cleanup of the site by excavation and off-site disposal or incineration of all soils with concentrations of one or more of the target pesticides above the MTCA Method B cleanup level for soil. Monitoring of the perched groundwater in the vadose zone will be performed to confirm that either concentrations in the perched groundwater are below the selected cleanup levels of all of the target

pesticides or that no ~~continuous~~ perched groundwater-bearing zone is present in the vadose zone soils at the Site.~~.~~ No pesticides at concentrations above applicable cleanup standards will remain on the site upon the completion of the final cleanup action. The final cleanup action will be protective of both human health and the environment and will result in a permanent and final cleanup solution for the site.

4.1.2 Restoration Time Frame

The site cleanup is scheduled for late June to early July 2000. Farallon estimates approximately 6 to 8 weeks to complete the soil removal and site restoration. A preliminary construction schedule is shown on Table 7. The perched groundwater in the vadose zone sumps will be decommissioned in accordance with WAC 173-160 at the completion of the perched groundwater monitoring.

4.1.3 Final Closure

The site will be removed from the Hazardous Sites List once confirmation soil and perched groundwater in the vadose zone sampling and monitoring have been completed and validates that the cleanup levels for soil and perched groundwater have been met at the defined points of compliance. A final removal of the site from the Hazardous Site List will be provided by Ecology once perched groundwater compliance sampling confirms that either the cleanup levels for perched groundwater have been met at the defined points of compliance or it is determined that no ~~continuous~~ perched groundwater-bearing zone is present in the vadose zone soils at the Site.~~.~~

4.2 DEFINITION AND DELINEATION OF EXCAVATION AREAS

The soil categories agreed to by Ecology and defined in the EMMP will determine the specific excavation, handling, transportation, and disposal requirements as defined in the EMMP and discussed in more detail in this CAP. The results of the site soil sampling have been used to define the distribution of the soil types at the site. The distribution of each soil category on-site and its estimated volume is discussed below.

4.2.1 Category 1 Soils

The analytical results of soil samples that meet the criteria of Category 1 Soils are summarized on Table 2. The areas with soil that meet the criteria for Category 1 Soils from surface to a depth of one-foot bgs (Lift 1) are shown on Figure 3. The Category 1 Soils from 1 to 2 feet bgs (Lift 2) or from 2 to 3 feet bgs (Lift 3) are shown on Figures 4 and 5. Based on the distribution of soil that meet the criteria of Category 1 Soils, Farallon has estimated that a total of 400 tons of Category 1 Soils will be excavated from the site.

4.2.2 Category 2 Soils

The analytical results of soil samples that meet the criteria of Category 2 Soils are summarized on Table 3. The areas with soil that meet the criteria for Category 2 Soils in Lift 1 are shown on Figure 3. The areas of soil that meet the criteria for Category 2 soils in Lift 2 are shown on Figure 4, and those in Lift 3 are shown on Figure 5. Farallon has estimated that a total of 725 tons of Category 2 Soils will be excavated from the site.

4.2.3 Category 3 Soils

The analytical results of soil samples that meet the criteria of Category 3 Soils are summarized on Table 4. The areas with soil that meet the criteria for Category 3 Soils in Lift 1 are shown on Figure 3. There are no Category 3 Soils in Lift 2 or Lift 3. Farallon has estimated that a total of 25 tons of Category 3 Soils will be excavated from the site.

Additional soil samples will be collected for TCLP analysis at the sample locations that meet the criteria for Category 3 Soils, as discussed in the SAP. The analytical results of the TCLP analysis will be evaluated to determine whether the soil will be handled as a contained-in soil similar to Category 2 Soils, or if it will be designated as a dangerous waste for incineration similar to Category 4 Soils.

4.2.4 Category 4 Soils

The analytical results of soil samples that meet the criteria of Category 4 Soils are summarized on Table 5. The areas with soil that meet the criteria for Category 4 Soils in Lift 1 are shown on Figure 3. There are no Category 4 Soils in Lift 2 or Lift 3. Farallon has estimated a total of 250 tons of Category 4 Soils will be excavated from the site.

4.3 PRE-EXCAVATION SITE PREPARATION

Prior to excavation at the site, the following will be completed:

4.3.1 Protection Monitoring Instruments

The Health and Safety Plan (HASP) included in Appendix D requires personal protection equipment (PPE) during the site excavation that includes continuous dust (protection) monitoring apparatus. To monitor airborne dust, a Miniram PDM-3 air sampling instrument will be used at the site to monitor air quality in the breathing zone during cleanup activities. The Miniram instrument will be used to monitor air quality and the airborne particulate material during the final cleanup activities. The specific air monitoring instrument, operating and monitoring procedures, and documentation are defined in the site-specific HASP.

4.3.2 Installation of Erosion Control Measures

Erosion control measures will be required to mitigate any potential for off-site migration of pesticide-laden sediments during the site excavation. A detailed Erosion and Sedimentation Control Plan is included with the Grading Permit Application attached in Appendix B. The Erosion and Sediment Control Plan provides specific construction details for erosion control during the site excavation. Erosion control to be installed prior to excavation will include:

- Control and containment of stormwater runoff
- Control and containment of dust
- Control and containment of mud on equipment and truck tires
- Control and containment of decontamination washwater

Location of underground utilities will be completed on-site with the erosion control. It is likely that the underground utilities will be disconnected and temporarily capped during the excavation.

4.3.3 Collection of Category 3 Soils Samples

In-situ soil samples will be collected from the soil sample locations that meet the criteria for Category 3 Soils. The soil samples will be collected in accordance with the SAP, and will be analyzed for TCLP. The analytical results will be reviewed to determine if the soils meet the criteria for the Contained-In Determination, or if they will meet the criteria as a dangerous waste.

4.3.4 Removal of Garage, Vegetation, and Concrete Paving

The existing garage will be demolished. The demolition debris and all above-grade vegetation and concrete paving will be removed and disposed of off-site. This will include all trees, shrubs, concrete walkways, and other debris currently stockpiled on-site. These materials will be disposed of in a suitable landfill as construction debris . Care will be taken during this task not to disturb the surface and shallow subsurface soils.

4.3.5 Construction of Contamination Reduction Corridor/Support Zone

A contamination reduction corridor (CRC) will be constructed in the area of the former garage and driveway along the northern side of the site (Figure 6). Contaminated soil in this area will be removed during the first phase of excavation to provide an area of clean soil for a CRC, a staging area for soil disposal drop boxes, and a support zone excluded from the contaminated portions of the site during cleanup activities. The total area of the CRC will be approximately 4,550 ft^2 extending approximately 150 feet from the northeast corner of the site toward the western property line, as shown on Figure 6.

Contaminated soils will be excavated from the CRC to clean soils, as discussed below in more detail. Once the analytical results of confirmation soil samples collected in accordance with the SAP are confirmed, the CRC area will be constructed. An impermeable liner of geotextile fabric will be placed on clean backfill and overlain with crushed rock to provide a support zone for completion of the site cleanup, as well as a clean, stable platform for staging of soil bins and dump trucks.

4.3.6 Delineation of Loading and Holding Areas

An area within the CRC will be designated for the Category 4 Soils locked drop-box, drop-off, storage, and pick-up area. The designated space will be used as a holding area while soil drop boxes are filled with Category 4 Soils. Figure 6 shows the proposed soil drop box holding area.

A specific area within the CRC will be constructed for loading of Category 1 and 2 Soils directly into dump trucks. The CRC will be constructed such that non-excavation equipment, such as dump trucks, drop box loading trucks, and support vehicles, do not come in contact with contaminated soil and only drive on clean backfill.

4.3.7 Decontamination Truck Wash Area

A truck wash area and decontamination washwater containment area will be constructed within the CRC to avoid any potential for contaminated soils to be transported off-site by truck wheels. The proposed truck wash area is shown on Figure 6 and will consist of an area for visual inspection of all truck wheels by on-site personnel. Soils will be swept off by hand prior to the truck leaving the CRC to the public street. If wet soils have adhered to the truck wheels, a power washer system will be used to clean the truck prior to departure from the site. Decontaminated washwater will gravity flow to a plastic- lined and bermed catch basin pending disposal.

4.4 SOIL EXCAVATION/HANDLING AND SEQUENCING

The Category 1 and 2 Soils will be managed as dangerous waste during excavation to eliminate the potential exposure pathways and associated risks to human health and the environment. However, Ecology has designated the Category 1 and 2 Soils as contained-in for disposal at an appropriate landfill, as discussed in the EMMP. The Category 4 Soils will be designated dangerous waste and will be handled, transported, and disposed of in accordance with the restrictions imposed by WAC 173-303.

The different designation of the soil categories and distribution at the site will dictate the overall excavation and handling approach used for cleanup of the site. Detailed and careful procedures as defined in this CAP will be employed to segregate each soil type during excavation to meet

the requirements of the Contained-In Determination. A backhoe will be used for the majority of the excavation; however, the limited soil excavation inside the existing residence will be performed manually due to the access limitations within the residence.

The site was delineated into subareas to guide the sampling for the RI/FS (RI/FS Subareas). To help guide the excavation, The RI/FS Subareas have been modified into different Subarea definitions. The site has been delineated into the following horizontal areas to guide the excavation: The CRC Subarea, Exterior Subarea, and Interior Subarea (Figure 6). The vertical distribution of the concentrations of the target pesticides is limited to a maximum depth of 3-feet bgs based on the results of previous soil sampling and analysis. The actual depth of the final excavation will be defined by the results of the performance sampling. Thus the site has been delineated into vertical areas to guide the excavation: Lift 1 - surface to 1 foot bgs; Lift 2 – 1 to 2 feet bgs; and Lift 3 – 2 to 3 feet bgs. The areal and vertical distribution of the soil categories is shown on Figures 3, 4, and 5.

The excavation procedures to be used for the site cleanup will be staged by horizontal and vertical subarea.

4.4.1 Soil Category Handling Procedures

Categories 1, 2, 3, and 4 soils occur throughout the site in Lift 1. Only Category 2 soils occur in Lift 2 throughout the site. Lift 3 contains limited areas of Category 1 and 2 soils.

4.4.1.1 Category 1 Soils

Category 1 Soils will be excavated and loaded directly into dump trucks staged in the CRC. The dump trucks will be equipped with tarp covers for transportation to an approved landfill.

4.4.1.2 Category 2 Soils

Category 2 Soils will be excavated and loaded directly into lined and diapered dump trucks staged in the CRC. The dump trucks will be equipped with tarp covers for transportation to an approved landfill.

4.4.1.3 Category 3 Soils

Category 3 Soils that have TCLP concentrations below the threshold limit will be loaded directly into lined and diapered dump trucks equipped with tarp covers for transportation to an approved landfill. Category 3 Soils that have TCLP concentrations above the threshold limit will be loaded directly into locked drop boxes stored in the CRC for transportation to an incinerator.

4.4.1.4 Category 4 Soils

Category 4 Soils will be excavated and loaded directly into locked drop boxes staged in the CRC. Category 4 Soils will be temporarily stored in the drop boxes on-site in the CRC holding area until the particular drop box is full. Full drop boxes will be covered for transportation to an incinerator.

4.4.2 Excavation Sequencing

The sequencing of soil excavation will include five separate phases: 1) Excavation of Lifts 1, 2, and 3 in the CRC Subarea; 2) Excavation of Lifts 1, 2, and 3 in the Interior Subarea; 3) Excavation of Lift 1 in the Exterior Subarea; 4) Excavation of Lift 2 in the Exterior Subarea; and 5) Excavation of Lift 3 in the Exterior Subarea. The areas of Lift 1 with Category 4 Soils will be excavated first, in the CRC and exterior subareas, followed by areas with Category 2 Soil, and completed with Category 1 Soils. This procedure will be utilized for each lift in each Subarea until the site cleanup is completed. The excavation will be guided by performance soil sampling to delineate the extent of the areas with each soil category type based on *in-situ* samples as defined in the SAP. Analytical results of performance samples that are non-detect will be considered compliance samples and will be used for site closure. A detailed discussion of the performance sampling/compliance protocols is provided in the SAP.

4.4.2.1 CRC Subarea Excavation

The CRC Subarea is shown on Figure 6. The distribution of the soil categories within each lift are shown on Figures 3, 4, and 5. Following excavation of the CRC Subarea, compliance soil samples will be collected in accordance with the SAP to confirm that all of the contaminated soil has been removed and that the CRC can be constructed.

Category 3 Soils located in Lift 1 on the northwest side of the garage (RI/FS sample location B5, Figure 3) will be resampled prior to excavation of the CRC Subarea. If the analytical results are below the TCLP levels, the soil will be excavated and handled as Category 2 Soil. If the analytical results are above the TCLP levels, the soil will be excavated and handled as Category 4 Soil, as discussed below.

The first phase of excavation to prepare the CRC will include excavating portions of the CRC area to a proposed total depth of three feet bgs. The two small areas of Category 4 Soils adjacent to the north side of the garage and residence in Lift 1 (Figure 3) will be excavated and placed directly into locked drop boxes for transport and incineration off-site. The Category 2 Soils in Lifts 1, 2, and 3 will be excavated and loaded directly into lined and diapered dump trucks equipped

with tarp covers for immediate transport off-site to an approved disposal facility. The Category 1 Soils in Lifts 1 will be excavated and loaded directly into covered dump trucks equipped for immediate transport off-site to an approved disposal facility.

The CRC area will be backfilled with clean imported material after compliance sampling results confirm that all contaminated soil has been removed. The CRC staging area will be constructed as discussed above after placement of the backfill in order to continue the site cleanup.

4.4.2.2 Interior Subarea

The Interior Subarea is defined as the area located on the southwest portion of the residential building interior (Figure 6) which was the RI/FS Subarea 1. Excavation of the interior subarea will require saw cutting of the concrete floor slab and removal of the concrete debris. The concrete debris will be disposed of off-site as construction debris.

The soils underlying the concrete slab area will be excavated by hand to approximately two feet below the bottom of the slab elevation (Figures 3 and 4). The RI/FS results indicate that the soils in this area meet the criteria as Category 2 or 3 Soils. Additional soil samples will be collected from this Subarea prior to excavation to determine the specific handling and disposal requirements. Soil that meets the criteria as a Category 2 Soils will be excavated by hand and will be stockpiled outside of the building and transported from the stockpile by backhoe to lined and diapered dump trucks for immediate off-site disposal. Soil that meets the criteria of a Category 4 Soils will be transported from the hand-excavated stockpile to locked drop boxes staged in the CRC for off-site disposal.

The excavation will be backfilled with clean imported soils after the cleanup of the Exterior Subarea is completed. The backfill will be compacted and a new concrete slab will be placed.

4.4.2.3 Exterior Subarea

This Subarea comprises the entire area outside of the residence excluding the CRC. The Subarea includes the RI/FS Subareas 2, 3, 4, and the Buffer Zone. This Subarea also includes the stormwater drainage ditch on the west edge of 62nd Avenue NE (Figure 6). The Exterior Subarea will be excavated using a rubber-tired backhoe and a front-end loader.

Excavation of Lift 1

Excavation of Lift 1 includes the removal of Category 1, 2, 3, and 4 Soils as shown on Figure 3. Performance sampling defined in the SAP will delineate the lateral extent of each soil type within Lift 1. The preliminary lateral delineation shown on Figure 3 is based on the results of the RI/FS and provides a useful guide for the excavation. The exact limit of each soil category will be defined during the excavation by the results of the performance sampling.

Category 4 Soils will be excavated first, starting with the four areas located in the western portion of the site, followed by excavation of the areas located on the east side of the residence (Figure 3). The Category 4 soils will be excavated and placed in locked drop boxes temporarily stored on-site in the CRC pending off-site disposal once the locked drop boxes are full.

Category 3 Soils located on the southwest side of the site (sample location S-10 and B-18, Figure 3) will be resampled prior to excavation of Lift 1 of the Exterior Subarea. If the analytical results are below the TCLP levels, the soil will be excavated and handled as a Category 2 Soil. If the analytical results are above the TCLP levels, the soil will be excavated and handled as a Category 4 Soil, as discussed below.

Category 2 Soils will be excavated from Exterior Subarea from the areas shown on Figure 3 and loaded directly into lined and diapered dump tucks for off-site disposal.

The Category 1 Soils to be excavated from the areas shown on Figure 3 and loaded directly into dump trucks for off-site disposal.

Compliance/performance sampling results will be collected at the base of the excavation completed for Lift 1 to determine the soil categories in each area and areas where deeper excavation is necessary well as. The results of the RI/FS will be incorporated with the cleanup compliance/performance sampling results to guide the excavation for Lift 2.

Excavation of Lift 2

The results of the RI/FS indicate that there are limited areas of soil that will require cleanup in Lift 2 of the Exterior Subarea, all of which meet the criteria for a Category 2 Soils (Figure 4). The soil excavated from Lift 2 of the Exterior Subarea will be loaded directly into lined and diapered dump trucks for off-site disposal.

Compliance/performance sampling results will be collected at the base of the excavation completed for Lift 2 to determine the soil categories in each area and where deeper excavation is necessary . The results of the RI/FS will be

incorporated with the cleanup compliance/performance sampling results to guide the excavation for Lift 3.

Excavation of Lift 3

The results of the RI/FS indicate that there are very limited areas of soil which will require cleanup in Lift 3 of the Exterior Subarea, all of which meet the criteria for a Category 1 Soils (Figure 5). The Category 1 Soils excavated from Lift 3 of the Exterior Subarea will be loaded directly into dump trucks for off-site disposal.

Compliance/performance sampling results will be collected at the base of the excavation completed for Lift 3 to determine the soil categories in each area and areas where deeper excavation is necessary. The results of the RI/FS indicated that deeper excavation will not be necessary.

4.5 WASTE DISPOSAL

4.5.1 Soil Waste Disposal

The selected disposal facility for the soil waste generated from the site cleanup has been agreed to by Ecology and is defined by each soil category in the EMMP. The following disposal facilities will be used for disposal of the waste soil excavated from the site:

4.5.1.1 Category 1 Soils

Category 1 Soils will be disposed of as non-dangerous waste at a landfill that meets the requirements of Chapter 173-351 WAC (within Washington State) and/or a Subtitle D landfill (outside Washington State).

4.5.1.2 Category 2 Soils

Category 2 Soils will be disposed of as a contained-in waste soil at a RCRA Subtitle C landfill. The landfill will be instructed that these soils are not to be used for daily landfill cover.

4.5.1.3 Category 3 Soils

Category 3 Soils with the analytical results of *in-situ* soil samples collected prior to excavation that are below the TCLP levels will be disposed of as a contained-in waste soil at a RCRA Subtitle C landfill. The landfill will be instructed that these soils are not to be used for daily landfill cover. Category 3 Soils with the analytical results of *in-situ* soil samples collected prior to excavation that are above the TCLP levels will be disposed by incineration.

4.5.1.4 Category 4 Soils

Category 4 Soils will be disposed of by incineration.

4.5.1.5 Selected Disposal Facilities

The RCRA Subtitle D landfill selected for disposal of the Category 1 Soils is the Regional Disposal Company Roosevelt Regional Landfill, Permit #CU 92-14. A copy of the Permits and Certifications for the Roosevelt Regional Landfill dated December 1999 is retained on file at the Farallon office. Farallon is currently evaluating costs associated with alternative Subtitle D landfills. Ecology will be notified if an alternative Subtitle D landfill is selected for disposal of the Category 1 Soils.

The RCRA Subtitle C landfill selected for disposal of the Category 2 Soils and Category 3 soils that do not fail the TCLP is the Waste Management Industrial Services Subtitle C Landfill located in Arlington, Oregon. A copy of the Arlington Facility Guidebook is retained on file at the Farallon office. Farallon is currently evaluating costs associated with alternative Subtitle D landfills. Ecology will be notified if an alternative Subtitle C landfill is selected for disposal of the Category 2 Soils.

The Category 4 Soils and Category 3 Soils that fail the TCLP analysis will be transported to Onyx Environmental Services Incineration Facility in Texas. A copy of the permitting information for this facility is retained on file at the Farallon office. Farallon is currently evaluating costs associated with alternative incineration facilities. Ecology will be notified if an alternative incineration facility is selected for disposal of the Category 4 Soils.

4.5.2 Waste Water Disposal

Wastewater, including extracted perched groundwater in the vadose zone, surface water, and decontamination washwater, will be disposed of to the sanitary sewer in accordance with the existing DA. Batch sampling, as defined in the SAP, will be conducted to confirm compliance with the discharge limits. A temporary inlet will be created at the edge of the site to allow for the excavation.

4.6 SITE RESTORATION

The site restoration will include returning the site to a condition similar to those prior to the site cleanup. The site will be backfilled to a level grade similar to the pre-excavation grade. Hydroseeding will be placed on exposed soil to prevent excess erosion and potential runoff. The erosion control measures will be left in place until vegetation has been re-established.

4.6.1 Backfill

The Exterior Subarea will be backfilled to within 6-inches of the final grade with a non-select material compacted to a non-yielding state. A 6-inch lift of clean topsoil will be placed on the entire site.

The Interior Subarea will be backfilled with a Class B Pit run to the bottom of slab elevation. A 6-inch thick reinforced replacement concrete slab will be doweled into the existing slab.

The geotextile liner and gravel surfacing will be left in place within the CRC Subarea.

4.6.2 Hydroseeding/Landscaping

Exposed backfill in the Exterior Subarea will be hydroseeded with a residential seed mixture. Planting of ornamental landscaping is not included with this CAP, nor is replacement of concrete walkways.

4.6.3 Reconstruction of Garage

Reconstruction of the garage will be performed once the hydroseeding is completed. A structure similar to the previous two-car garage will be constructed in the same general area as the former garage. Farallon will consult with the property owner to obtain final approval of the site restoration plans.